MODELLING STUDENTS' CHOICE OF BASIC VS. ADVANCED MATHEMATICS IN UPPER SECONDARY EDUCATION

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Building on the work of Woods (1976) and Sammons (1997), Van de Werfhorst, Sullivan, and Cheung (2003) introduced into the discussion regarding students' choice of subjects and educational paths the concept of comparative advantage to refer to their relative success in different subjects. The notion is especially valuable in view of the continuing gender difference in the STEM fields despite the late decline in between-gender differences in the STEM subjects in international assessments, such as PISA and TIMSS. The focus of the present study is on the relative role students' grades in the STEM vs. language/ humanistic subjects play in their choice of basic vs. advance math in Finnish upper secondary education, a choice shown earlier to predict students' overall success in the Finnish matriculation examination (Kupiainen, Marjanen & Hautamäki, 2015). The data is drawn from an ongoing longitudinal study of 10,000 students from the beginning of lower secondary to the end of upper secondary education, including register data on students' grades at the end of compulsory education. In the structural equation model (SEM), students' choice of basic vs. advanced (values 1–3 including change from advance to basic before grade 11) mathematics is predicted on their report card math grade at grade 6, mathematical competence measured at grades 7 and 9 with two different tests (mathematical thinking and arithmetic), and mathematical self-concept at grades 7 and 9. The difference between students' grades in the STEM and non-STEM subjects (comparative advantage) at their final grade 9 report card will be used as a mediator in the model. Earlier phases of the study have shown that in the grade 9 report card, girls have higher grades than boys do in all subjects. In addition, there are considerable between-subject differences in the grades with the STEM subjects graded more strictly, leading to smaller between-gender differences, emphasising the potential for comparative advantage. Boys and girls choosing advanced math differ little except for boys' slight advantage in the arithmetic task at all grade levels. The model fit is good (CHI-SQUARE=187.873/48; CFI=.994; TLI=.983; RMSEA=.011), explaining 45 % of the variance in the choice. The comparative advantage has as strong an effect on the choice as do the independent effects of grade 7 and 9 math competence (.15 each). The effect of grade 7 math self-concept is mediated by the comparative advantage whereas students' math self-concept at grade 9 proves to have the strongest independent effect on the choice (.32). The study provides light on the effect of between subject differences in grading on students' later educational choices and on the development of their academic self-concept.